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Success Story

FLEXIBLE AND SURVIVABLE NON-VOLATILE MEMORY DATA RECORDER

The Munitions Directorate developed a dedicated high-performance, non-volatile memory data recorder to improve flexibility over systems currently available. The directorate merged two different state-of-the-art, non-volatile memory technologies with reduced instruction set computer microprocessor technology to remove the need for the data recorder power source to survive for a relatively long duration after impact.

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Accomplishment

The directorate contracted with Thomson Thorn Missile Electronics, Ltd., of the United Kingdom, to develop a non-volatile memory data recorder for the electronic control module (ECM) of the Multiple Event Hard Target Fuze (MEHTF) program. The directorate demonstrated impact shock survivability in MEHTF gun tests when the ECM units, which employ the same technology as the data recorder, survived multiple supersonic concrete impacts. The recovered data from these tests demonstrated that the technologies operated correctly and provided stable recorder characteristics during the impact shock conditions.

The directorate proved the application of the technologies for data storage and provided evidence that the design will operate during and after successive applications of high-gravitational environments. A number of possible physical arrangements are available, depending on the probable use of the units and their requirements for built-in accelerometers. In order for the design to provide maximum applicability in munitions testing, engineers will package the electronics in a smaller volume, allowing easy location in a standard three-inch fuze well booster cup assembly. In addition, further engineering of the data recorder software will allow a wide range of recording modes required for typical munitions gun tests.

Background

In the world of munitions testing, high-gravitational constant impact conditions place special constraints on test equipment. In order to obtain useful data from gun tests, data-logging devices must meet several requirements. They should be easy to set up and small enough to fit in the limited space available in impact test vehicles. They should have an adequate range of inputs to store anticipated data and be flexible enough to permit the storage parameters of the unit to capture a wide range of possible signatures. They should operate under the extreme shocks present in gun test impacts with unmodified response characteristics, retain the data after the impact, and be reusable.

Current data recorder technologies address some of these requirements, however, they contain volatile memory, which must be maintained using a power source until the data is removed from the recorder and processed. Locating penetrators after testing can be difficult, therefore, it is undesirable to sustain a power source until the projectile is located. A recorder that contains non-volatile memory would be more beneficial since this type of memory does not require a sustainable power source after the penetration event is complete.

Munitions
Emerging Technologies

Additional information

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